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Focus Control System for Solar Thermal Propulsion

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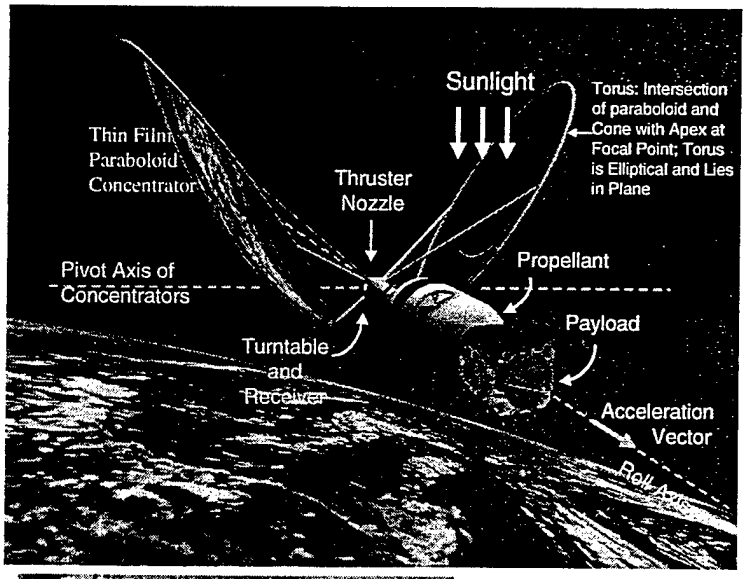
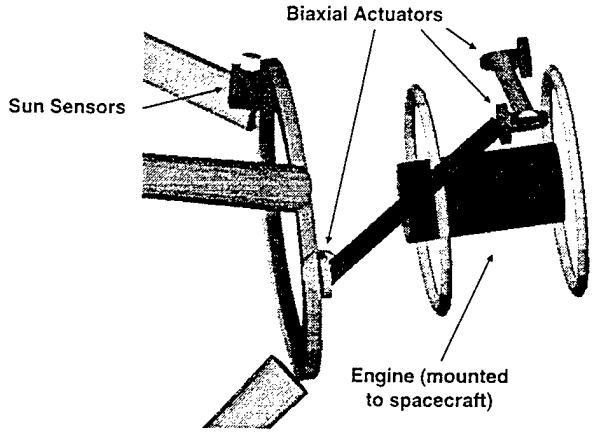
Solar thermal propulsion (STP) uses a parabolic concentrator like a large magnifying glass to focus the sun's energy and heat a working fluid such as hydrogen to very high temperatures (3,000 K). The hydrogen is then expelled through a nozzle to produce thrust. This innovative concept has twice the efficiency of currently used chemical upper stage propulsion systems. Inflatable solar concentrators can be packaged more efficiently than rigid concentrators of equal power. The Air Force Research Lab is sponsoring Thiokol Propulsion and SRS Technologies to design, build, and demonstrate an inflatable STP system. This paper will address the use of ADAMS and MATRIXx to develop the structure's focus control system, which uses an articulated mechanism to track the sun and focus the solar energy. Animations of the closed-loop 3-D models have been developed to show the feasibility of the concept.





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